GenRad

GenRad

GR1000e, GR2000, GR4000 Site Preparation Guide

9007-3012-01

Printed in U.S.A.
October, 1998

Symbol ⚠ IEC417 on equipment signifies that the manual contains information to prevent injury or equipment damage. Refer to page vi and to other manuals in set.

Copyright © GenRad, Inc. 1998. All rights reserved under copyright laws of the United States and other countries. The technical data included herein, excluding computer software documentation, is subject to the LIMITED RIGHTS as set forth in FAR 52.227-15 (JUN 1987) and DFARS 252.227-7015 (JUN 1995). All technical data and computer software documentation contained herein is proprietary and confidential to GenRad, Inc. or its licensor. All computer software documentation contained herein is Commercial Computer Software Documentation, proprietary to GenRad, Inc. or its licensor and furnished under limited license only. For solicitations issued by the United States, its agencies or instrumentalities (the "Government") on or after December 1, 1995 and the Department of Defense ("DoD") on or after September 29, 1995, the only rights provided in the Commercial Computer Software Documentation shall be those specified in a license customarily provided to the public by GenRad, Inc. in accordance with FAR 12.212 (a) and (b) (OCT 1995) or DFARS 227.7202-3 (a) (JUN 1995). For solicitations issued before December 1, 1995 by the Government (other than DoD) use, duplication or disclosure of the documentation shall be subject to the RESTRICTED RIGHTS as set forth in subparagraph (c) (1) and (2) of the commercial computer software – restricted rights clause at FAR 52.227-19 (JUN 1987). For solicitations issued before September 29, 1995 by DoD: RESTRICTED RIGHTS LEGEND – The use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 (OCT 1988).

The following are trademarks or registered trademarks of GenRad, Inc.:

7Xpress
Access Remote Support
AccuWave
A New Way of Thinking
ATG-32
ATG XPRESS
AutoDebug Plus
BasicSCAN
BugHound®
BusBust ®
Cap Xpress
ChipCheck
Diamon
Digibridge®
Dr. Test
ENCOMPASS
ETG
FAST
FASTCELL
GENESIS
General Radio Co.®
General Radio®
GENEVA®
GenRad ®
GPTI
GR®
GR AccelerATE
GRnet ®
GR Pilot
GR Vision
GRXpert
InPro
ISOcal
JDS
Junction Xpress
Opens Xpress
OptomATE
Orient Xpress
Panel-Test
Paragon
PATH
PinPoint
Program Xplorer
Scan Pathfinder
Scratchprobe
Scratchprobing
SoftProbe
SpeedPlus
Stinger
TestFlo
TEST XPRESS
"The Difference in Software is the Difference in Test"
TRACS®
VIPER®
VXIscan®
XL
XP
Xtended Performance
Xpress Model
Xpress Nail

Product names listed are trademarks of their respective manufacturers. Company names listed are trademarks or trade names of their respective companies.

The material in this manual is for informational purposes only and is subject to change, without notice. GenRad assumes no responsibility for any error or for consequential damages that may result from the use or misinterpretation of any of the procedures in this publication.

We at GenRad strive to achieve the highest possible **customer satisfaction** through innovative products and services, and continuous improvement of our product quality and support.

To help us achieve our goal, we ask that you:

- Please fill out and return the Reader Comments card, located at the back of this manual, if you have any suggestions for structure or content improvements.
- Please document any product problems or enhancement requests on the GenRad System Performance Report forms, supplied with the equipment documentation, and return them to the GenRad Customer Care Center (CCC). The contact addresses are in the Preface of this manual.

Thank you for choosing GenRad as your integrated diagnostic solutions provider.

WARNINGS

- Do not remove covers. Potentially lethal voltages are present inside the system. Observe all WARNING markings on the equipment and WARNING notices in the manual. If servicing is necessary, it should be performed only by a qualified person familiar with the electrical shock hazards present inside the system.

- Grounding circuit continuity is vital for safe operation of the equipment. Never operate equipment with grounding conductor disconnected.

- Safeguard your hands and fingers while handling any fixture or other accessory. Be sure it is securely supported if you reach under it. If it is heavy, you must have another person help to move it.

- The symbol IEC417 on equipment signifies that the manual contains information to prevent injury or equipment damage. Observe and heed all WARNING notices in the manuals and the equipment. WARNINGS call attention to personnel safety information.

- Replace any fuse only with the same type and ratings as labeled on the equipment and/or listed in the manual.

MISES EN GARDE

- Ne pas enlever les couvercles. Les niveaux de tension se trouvant dans le système sont extrêmement dangereux. Respectez toutes les consignes de sécurité figurant sur l'équipement et les MISES EN GARDE données dan ce manuel. Seule une personne qualifée, connaisant les risques de décharge électrique du système, est autorisée à effecteur les opérations de nettoyage ou de réparation du système.

- Le circuit doit être mis à la terre sans discontinuation pour garantir un fonctionnement sans danger de l'équipement. Ne jamais faire fonctionner l'équipement pendant que le raccord à la terre est déconnecté.

- Protégez-vous les mains et les doigts pendant le maniement de tout dispositif de serrage ou autre accessoire. Assurez-vous que ceux-ci soient bien solidement fixés en place, avant de vous pencher sous eux. Si l'accessoire en question est trop lourd, faites-vous aider pour le déplacer.

- Le symbole IEC417 figurant sur l'équipement signifie que le manuel contient des informations permettant d'empêcher les accidents ou l'endommagement de l'équipement. Respectez toutes les consignes de MISES EN GARDE données dans le manuel et figurant sur l'équipement. Les MISES EN GARDE attirent l'attention sur la nécessité de se protéger.

- Ne remplacez les fusibles qu'avec des fusibles du même type et de la même valuer que ceux mentionnés sur l'équipement et figurant dans le manuel.

WARNHINWEISE

- Abdeckungen nicht entfernen. Potentiell lebensgefährliche Spannungsbedingungen innerhalb des Systems vorhanden. Alle auf der Einrichtung befindlichen WARNMARKIERUNGEN und im Handbuch enthaltenen WARNHINWEISE beachten. Wartungsarbeiten dem qualifizierten Personal überlassen, das mit den innerhalb des Systems vorhandenen Gefahren eines elektrischen Schlags vertraut ist.

- Die Erdung des Schaltungsdurchgangs ist eine Grundvoraussetzung für den sicheren Betrieb der Einrichtung. Einrichtung niemals ohne Erdleiter betreiben.

- Hände und Finger bei der Handhabung einer Spannvorrichtung oder eines anderen Zubehörteils schützen. Sich vor der Plazierung der Hände unterhalb der Einrichtung vergewissern, daß die Einrichtung über ausreichenden Halt verfügt. Falls die Einrichtung schwer ist, sich von einer anderen Person beim Tragen helfen lassen.

- Das auf der Einrichtung befindliche Symbol IEC417 bedeutet, daß das Handbuch Informationen zur Verhinderung von Körperverletzungen oder Sachschäden enthält. Alle in den Handbüchern enthaltenen und auf der Einrichtung befindlichen WARNHINWEISE beachten und befolgen. WARNHINWEISE sollen auf Informationen zur persönlichen Sicherheit aufmerksam machen.

- Sicherungen nur durch Sicherungen des gleichen Typs und der gleichen Nennleistung ersetzen. Auf der Einrichtung befindliche Etiketten und im Handbuch enthaltene Informationen zu Rate ziehen.

AVISOS

- Não remova as tampas. Há voltagens potencialmente fatais presentes na parte interna do sistema. Observe todas as marcações de AVISOS no equipamento e discrições de AVISOS no manual. Se for necessário fazer manutenção, esta deve ser feita somente por uma pessoa qualificada familiarizada com os perigos de choques elétricos presentes na parte interna do sistema.

- A continuidade do circuito de aterramento é vital para a operação segura do equipamento. Nunca opere o equipamento com o cabo de aterramento desligado.

- Proteja as suas mãos e dedos ao operar qualquer dispositivo ou outro acessório. Certifique-se que ele esteja suportado com segurança se você tiver que alcançar algo debaixo dele. Se for pesado, você deve ter a ajuda de uma outra pessoa para movê-lo.

- O simbolo no equipamento significa que o manual contém informações para prevenir ferimentos ou danos ao equipamento. Observe e preste atenção a todos os AVISOS nos manuais e no equipamento. Os AVISOS chamam a atenção a informações sobre a segurança pessoal.

- Substitua qualquer fusivel somente com um do mesmo tipo e da mesma capacidade nominal como marcado no equipamento e listado no manual.

ADVERTENCIAS

- No quitar las tapas. En el interno del sistema hay voltajes potencialmente mortales. Obsérvense todos los rótulos de ADVERTENCIA presentes en el equipo, así como la descripción de las notas de ADVERTENCIA presentadas en el manual. De ser necesario, el servicio de mantenimiento deberá ser efectuado únicamente por personal calificado que esté familiarizado con los peligros de choque eléctrico presentes en el sistema.

- La continuidad del circuito de puesta a tierra es de vital importancia para el functionamiento seguro del equipo. Nunca se debe usar el equipo con el conductor de puesta a tierra desconectado.

- Protéjanse las manos y los dedos toda vez que sea necesario manipular un dispositivo u accesorio. Cerciorarse de que el mismo esté firmemente sujetado antes de proceder a trabajar debajo de él. Si el aparato u accesorio fuera pesado, pedir la ayuda de otra persona para moverlo.

- El simbolo que aparece en el equipo significa que el manual contiene informaciones para evitar lesiones personales o daños al equipo. Obsérvense y préstese atención a toda las notas de ADVERTENCIA presentes en los manuales y en el equipo. Las ADVERTENCIAS sirven para llamar la atención sobre informaciones de seguridad para el personal.

- Reemplazar los fusibles únicamente con otros del mismo tipo y capacidad, según lo indique el rótulo en el equipo y la descripción en el manual.

CAUTIONS

- Observe and heed all CAUTION notices in the manuals and on the equipment. CAUTIONS call attention to information about safeguarding *equipment* from damage.

HANDLING PRECAUTIONS FOR ELECTRONIC DEVICES SUBJECT TO DAMAGE BY STATIC ELECTRICITY

Place instrument or module to be serviced, spare parts in conductive (anti-static) envelopes or carriers, hand tools etc. on a work surface defined as follows. The work surface must be conductive and reliably connected to earth ground through a safety resistance of approximately 250 kilohms. The surface must **NOT** be metal. (A resistivity of 30 to 300 kilohms per square inch is suggested.) Avoid placing tools or electrical parts on insulators.

Ground the frame of any line-powered equipment, test instruments, lamps, soldering irons, etc., directly to earth ground. To avoid shorting out the safety resistance, be sure that grounded equipment has rubber feet or other means of insulation from the work surface. The module being serviced should be insulated while grounded through the power-cord ground wire, but must be connected to the work surface before, during and after any disassembly or other procedure in which the line cord is disconnected.

Exclude any hand tools (such as non-conductive plunger-type solder suckers) that can generate a static charge.

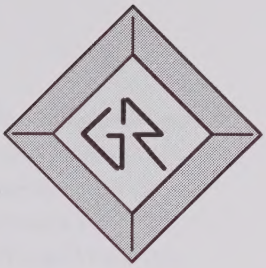
Ground yourself reliably, through a resistance, to the work surface; use, for example, a conductive strap or cable with a wrist cuff. The cuff must make electrical contact directly with your skin; do **NOT** wear it over clothing. (Resistance between skin contact and work surface through a commercially available personnel grounding device is typically 250 kilohms to 1 megohm.)

If any circuit or IC packages are to be stored or transported, enclose them in conductive envelopes or carriers. Remove them only with the above precautions; handle IC packages without touching the contact pins.

Avoid circumstances that are likely to produce static charges, such as wearing clothes of synthetic material, sitting on a plastic-covered stool (particularly while wearing wool), combing your hair, or making extensive erasures. *These circumstances are most significant when the air is dry.*

When testing static sensitive devices, be sure dc power is on before, during, and after application of test signals. Be sure all pertinent voltages have been switched off while boards or components are removed or inserted.

Contents



Preface

Overview ix
Audience ix
About this Manual x
Related GenRad Documentation x
Document Conventions xi
Manual Reorder Information xi
GenRad Customer Care Center xii

Introduction

Site Planning 1-1
Requirements and Routing 1-2
- Space Requirements 1-2
- Weight Requirements 1-2
- Environmental Requirements 1-2
- Power Requirements 1-3
- Cooling Requirements 1-3
- Delivery Routing 1-3

System Requirements

Introduction 2-1
Space and Weight Requirements 2-2
Environmental Requirements (at sea level) 2-4
- Operating Environment 2-4
- Storage Environment (Up to Three Months) 2-4

System Input Power Requirements 2-5
- Input Power Quality 2-5
- Standard Modular System with no Power Distribution Units (VXIcage Input Power Only) 2-6

System with Optional Single Phase PDUs 2-8
PDU Controls and Outputs 2-9
TB2 Wiring Connections 2-10
100 - 120V Input Power Connections 2-11
200 - 240V Input Power Connections 2-12
Input Power Verification 2-12
System with Optional 3 Phase Power Controller 2-13
Input Line Voltage Versions 2-13
Controller Input Power Requirements 2-14
208/120 VAC Input Power Configuration Range, – 60A Required Service 2-15
208/120 VAC Input Power Configuration Range, – 30A Required Service 2-17
380 - 415/220 - 240 VAC Input Power Configuration Range, – 32A Required Service 2-19
380 - 415/220 - 240 VAC Input Power Configuration Range, – 16A Required Service 2-21
Cooling Requirements 2-23
Test Fixture Procurement 2-23
Unpacking and Installation Tools and Equipment 2-24

Safety Considerations

Introduction 3-1
Fire Protection 3-1
Safety 3-1

Site Planning Considerations

Fixture Storage 4-1
Circuit Board Storage Racks 4-1
Site Suggestions 4-2
Remote Support Site Requirements 4-2
Telephone Line Selection 4-2
Telephone Cable Placement 4-3
FCC Requirements 4-3

System Supplies

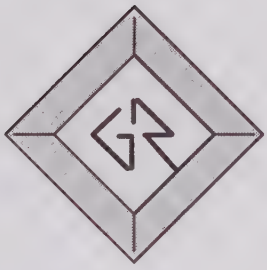
Printer Ribbon Cartridges 5-1
Printer Paper 5-1

Site Preparation Checklist

Description and Use A-1

Index

Preface



Overview

This guide describes the prerequisites to be considered before a GENEVA GR1000*e*, GR2000, and GR4000 Test System is installed or moved, or before optional equipment is added to the system. Aspects of safety and efficiency related to site selection, preparation and management are also described. This guide enables you to prepare a site for your system that permits the system to function in a safe, reliable and efficient manner, while enabling personnel to work in a comfortable and safe environment. Store this guide with other system documentation after installation. Refer to the guide when any changes to the configuration or site are contemplated.

Audience

This manual will benefit:

- System Manager or Administrator
- Site Manager

About this Manual

This section identifies the knowledge or tasks described in the chapters and appendices of this manual.

For information about	Read this Chapter or Appendix
the overview of the requirements necessary for effective site planning as well as information for routing the system to the installation site.	Introduction
space and weight; environmental; input power; and cooling requirements in addition peripheral site considerations and test-fixture procurement.	System Requirements
personnel and equipment safety; and fire protection.	Safety Considerations
a variety of other items to be considered in planning the site.	Site Planning Considerations
supplies (printer paper/ribbons, diskettes, etc) required for use with the system.	System Supplies
site preparation requirements to be performed by the customer prior to system delivery.	Site Preparation Checklist

Related GenRad Documentation

This section lists other GenRad manuals that may provide supporting or related information.

Manual Title	How it relates or supports this manual
GR1000e, GR2000, GR4000 Service Manual	provides service information and procedures for the GR1000*e*, GR2000, and GR4000 Test Systems

Document Conventions

The following document conventions are used throughout the documentation set.

Convention	Indicates
`Bold monospace text`	command text that you enter
Bold text	commands, keys, buttons, prompts, menu options, icons, and literals within text
`Courier text`	command, syntax, or error message
`Italic monospace text`	replace the *`term`* with a valid entry
Italic text	manual title, chapter title, or section title
P/N or PN	part number
[*text, text*]	field within the brackets is optional
{text, text}	select one or more choices within the braces
CAUTION	potential harm to the system or equipment as a result of this action
Example End Example	the beginning of an example the end of an example
NOTE	specialized information that may benefit you
NEXT	informational options that direct you to the next chapter or step
WARNING	potential harm to you as a result of this action

Manual Reorder Information

To reorder this manual, contact the GenRad Parts Sales group.

Part Number	Part Number (w/ 3–ring Binder)	Contact
9007–3012–01	N/A	GenRad Parts Sales 7 Technology Park Drive Westford, MA 01886–0033 Phone: (978) 589-7000 1–800–4–GENRAD (USA Only) (1-800-443-6723) To connect to Parts Sales, select the number 1, then the number 3. Fax: (978)–589–2064

GenRad Customer Care Center

GenRad offers customer support through the GenRad Customer Care Center (CCC). You can contact the Customer Care Center for assistance at any time if you are unable to solve a problem through the use of on-line help or product documentation. If the Customer Care Center is closed when you call, you can leave a voice mail message by phone.

Before contacting the Customer Care Center, please have the following information available:

- Your site number
- Hardware system type
- System serial number
- Software version number

You can contact the Customer Care Center by:

Phone	(978) 589-7332 1-800-4-GENRAD (USA Only) (1-800-443-6723) To connect to the Customer Care Center, select the number 1, then the number 2.
Fax	(978) 589-2080 (Customer Care Center) (978) 589-7007 (GenRad Main)
E-mail	cs1@genrad.com
Mail	GenRad, Inc. 7 Technology Park Drive, MS 6 Westford, MA 01886-0033
World Wide Web	http://www.genrad.com
FTP	`ftp.genrad.com` **login:** anonymous **password:** your e-mail address `cd pub/pub` (public, for directory use ls) or `cd pub/incoming` (public, directory cannot be seen)

Introduction

Site Planning

Proper site planning prior to receipt of your system is the key to a smooth installation as well as efficient production flow during operation. Important items are space, weight, environmental, power, cooling requirements, and delivery routing.

A site preparation checklist is included in Appendix A to help you in preparing your site. After you have finished using this manual, store it with the other system documentation so that you can refer to it the next time you relocate or reconfigure the test system.

Requirements and Routing

The following requirements and routing information are an overview of major items related to the site planning process.

Space Requirements

Adequate space for the placement and servicing of the system and peripherals must be provided. In addition, space requirements for operating personnel, tables, chairs, and storage areas (for test fixtures, paper, etc) and sufficient space for adequate ventilation of the system components must also be considered. Refer to Chapter 2.

Weight Requirements

System weight, as well as the weight of peripheral equipment and other items to be positioned in the same general area, must be considered. The floor loading capacity must be sufficient for the weight involved. Most industrial plant floors support weights of 50 psf (2.4 kPa) or more, which is normally adequate for this type of equipment. If there is a question as to whether floor loading or structural considerations are adequate, a qualified structural engineer should be consulted prior to delivery. Refer to Chapter 2.

Environmental Requirements

A room with an air distribution system that provides cool, filtered, humidified air is recommended for this system. The air pressure within the room should be maintained at a higher level than the air pressure of adjacent areas, to prevent dust infiltration. While this system does not require an absolute clean-room environment, cleanliness and freedom from excessive heat and dust should always be a prime consideration to reduce the possibility of equipment failure caused by heat and dust build-up. Temperature and humidity specifications for the system and its peripheral equipment must be maintained within safe operating levels at all times. Refer to Chapter 2.

Power Requirements

Input power and grounding requirements must be considered before equipment installation. Sufficient AC power must be available for all equipment. Fuse- or circuit breaker-protected AC outlets should be located as close to the system as possible in order to keep cable runs short. Refer to Chapter 2 for AC input power requirements.

Cooling Requirements

The site cooling plant must be able to compensate for the heat produced when the system is in operation. The heat produced by the system, and any attached peripherals, is computed based upon the amount of current required by the system and its peripherals. Refer to Chapter 2 for heat generation estimates.

Delivery Routing

The route that the equipment is to travel from the receiving area to the installation site should be studied. Prior to equipment delivery, plans should be prepared to cope with such problems as bends or obstructions in hallways, elevator size, and weight limitations. Advance planning to eliminate obstructions along the delivery route can save valuable time during installation. Assume that the crated system will be moved from your receiving area to the system's installation site. Refer to Chapter 2 for VXIcage dimensions. Note that the VXIcage may be mounted in an optional cabinet when shipped to your site.

System Requirements

Introduction

This chapter describes the:

- Space and weight requirements
- Environmental requirements
- Input power requirements
- Cooling requirements
- Site considerations for peripheral equipment
- Test fixture procurement
- Ethernet requirements

The PC, monitor, printer, and other accessories are not packaged in the system crate, but are shipped in separate cartons.

A programmer/PC table is an available option. The surface of this table can be used for the PC, monitor, keyboard, mouse, and printer, or as an additional work surface for programming or production.

Space and Weight Requirements

Because the GR1000e, GR2000, and GR4000 are test systems with many optional components (including a mounting cabinet), standard shipping information is not available for the crated system and optional peripheral components. Each system may have unique shipping dimensions and weight. For space planning purposes, Table 2–1 lists dimensions and weight for the uncrated VXIcage and peripherals. Also for space planning purposes, Figure 2–1 and Figure 2–2 illustrate the shipping skid for the standard VXIcage, the larger shipping skid for a cabinet-mounted VXIcage, and unloading ramps for the cabinet. In these figures, some of the removable hardware (to partially disassemble the skid and remove the equipment) is highlighted.

When planning space requirements for the system and its optional peripherals, allow for the following:

- Leave a minimum of 40 in. (102 cm) from any system side and the nearest wall or any other obstacle. Do not block the air vents that are located on the front and rear of the system.
- Provide sufficient room around the system and its peripherals for operator and service personnel.

Table 2–1
Uncrated Dimensions and Weight

Component	Dimensions (w x h x d)	Weight†	
		kg	lb
VXIcage	20.75 x 33.25 x 28.12 in. (52.7 x 84.5 x 71.5 cm)	80 min. 136 max	175 min 300 max
Optional Freestanding Equipment			
Okidata Microline 320 Line Printer	15.7 x 4.6 x 13.6 in. (39.9 x 11.7 x 34.5 cm)	7.3	16
Cabinet (empty) 34U	24 x 68 x 35 in. (61 x 172 x 89 cm)	75	165
Cabinet (empty) 38U	24 x 75 X 35 in. (61 X 190 X 89 cm)	80	175
Cabinet (empty) 43U	24 X 84 X 35 (61 X 21 X 89 cm)	86	189
Programmer/PC Table	24 x 30.1 x 32 in. (61 x 76.5 x 81 cm)	27.22	60

†Actual VXIcage weight depends upon the number of installed instruments and scanners.

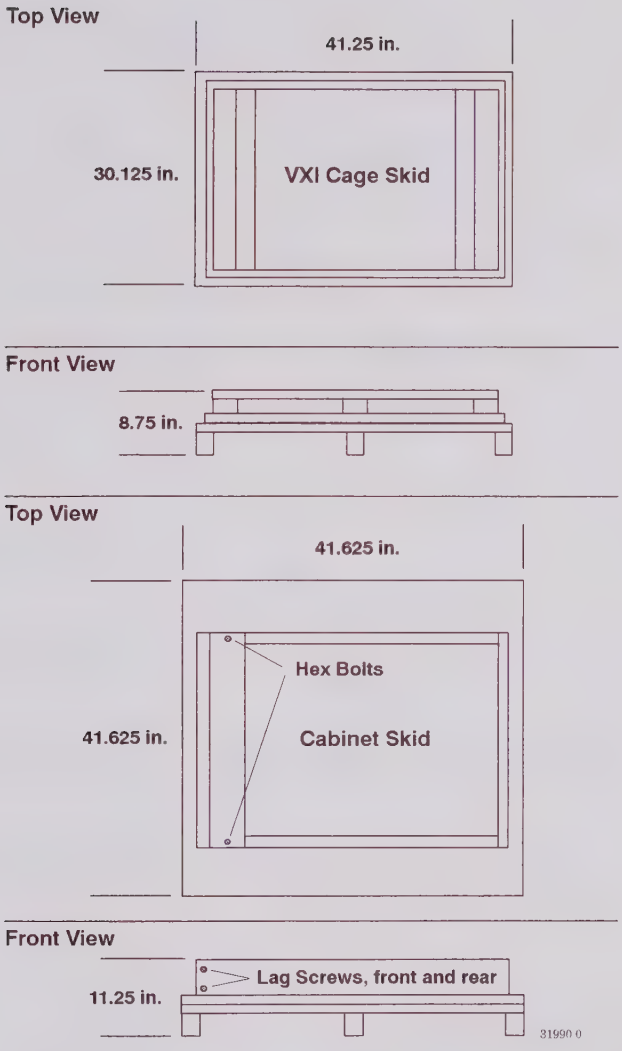


Figure 2–1 Shipping Skids

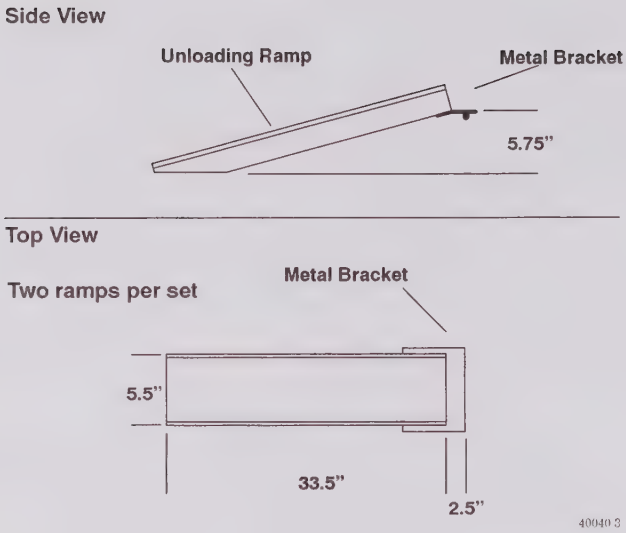


Figure 2–2 Unloading Ramps

Environmental Requirements (at sea level)

These operating and storage environmental limits apply to the system. Manufacturers of peripheral equipment may list operational temperature and humidity ranges that exceed the system limits shown below.

Operating Environment

- Humidity: 20 to 80%
- Temperature: 61 to 86°F (15 to 30°C)

Storage Environment (Up to Three Months)

- Relative Humidity: Up to 95%
- Temperature: -40 to +140°F (-40 to 60°C)

System Input Power Requirements

There are three configurations:

- Standard Modular System with no Power Distribution Units
- System with Optional Single Phase PDUs
- System with Optional 3 Phase Power Controller

For the Standard Modular System with no PDUs, the VXIcage AC cord connects to a power receptacle. For the Modular System with a Single Phase PDU, both VXIcage and PDU have separate AC cords which require separate power sources. The Modular System with a 3 Phase Power Controller, requires a single 3 Phase power source.

Input Power Quality

The primary AC power source to the system must be a clean line. The system may not function properly with any abnormal power-line disturbances such as transient spikes, dropped cycles, large voltage or frequency fluctuations, current surges, or voltage imbalances.

Converting the building power source, if required, to the system's input power requirement is the customer's responsibility. If needed, the customer must procure and install any power conversion or conditioning equipment prior to system installation.

After installation, no attempt should be made to convert the system from one input voltage configuration to another except by GenRad-trained service personnel.

Standard Modular System with no Power Distribution Units (VXIcage Input Power Only)

NOTE For this configuration, a single input cord is required.

The system's AC input power requirements are described in this guide. In addition, your local and country electrical codes apply. The GR1000*e*, GR2000, and GR4000 test systems, have two available AC input power configurations at 50 or 60 Hz:

Low Voltage Configuration	120 V ± 10%, Single Phase (2 wires plus ground), 16A
High Voltage Configuration	200 - 240 V ± 10%, Single Phase (2 wires plus ground), 8A

The country-specific, AC power cord plugs into J100 on the rear of the system. Figure 2-3 shows the J100 power pin variants.

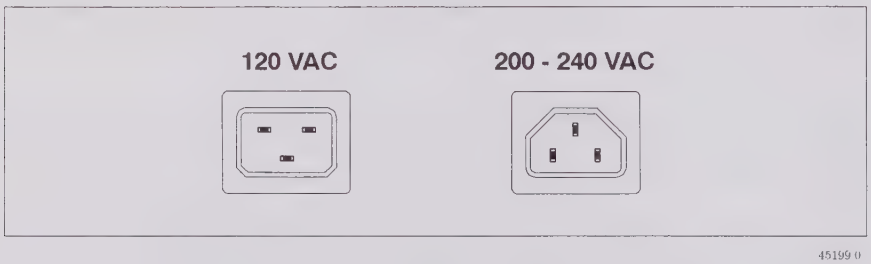


Figure 2-3 AC Input Power Connector Variants

GenRad offers AC input power cords with the plugs shown in Figure 2-4 for the GR1000*e*, GR2000, and GR4000.

Figure 2-4 AC Input Power Cord Plugs

If none of these power cords are compatible with the available power source, the customer must provide the appropriate power cord. Refer to Table 2–2.

CAUTION **Power cords and power source wiring must conform to local and country electrical and safety codes.**

Table 2–2
VXIcage Input Power Requirements

Requirements	**120 VAC ± 10%†**	**200 - 240 VAC ± 10%††**
Power	16A 50/60 Hz single phase 1920 VA maximum	8A 50/60 Hz single phase 1920 VA maximum
Power Cord Rating	125V 20A minimum	250V 10A minimum
System end connector	IEC 320 C19	IEC 320 C13
Power source end plug	NEMA 5-20P	††
Customer-provided receptacle	NEMA 5-20R	††

†20 A service requirements

††Country dependent service requirements

NOTE Allow sufficient lead time for the delivery of the power receptacle and associated cabling to insure the site power is ready for system delivery.

This product is intended for installation in accordance with IEC 664, Installation Category II. This category indicates that this product is designed for use at the local level and refers to the local power distribution within your building.

Some product options may require additional AC power for proper operation. Refer to Chapter 2 in the *GR1000e, GR2000, GR4000 Service Manual*.

Installation of the AC input power source and receptacle for the system is the customer's responsibility. Make certain that the receptacle connector that accepts the system's plug meets the system's voltage and current requirements.

System with Optional Single Phase PDUs

NOTE For this configuration, the system is provided with two or more input line cords. Power requirements are defined in Table 2–2. VXIcage input Single Phase PDU power requirements are defined in Figure 2–8 through Figure 2–11.

CAUTION **Do not plug the VXIcage power cord into the PDU. Some systems may contain the optional Power Distribution Unit (PDU). The PDU is designed to control AC power to the UUT power supplies or other rack-mounted instruments.**

The optional single phase power distribution unit (PDU) provides power control and power distribution functions in the cabinet where the PDU is mounted. Two PDU models are available, 100 - 120V input and 200 - 240V input. Figure 2–5 shows the PDU's control panel. The AC voltage present at IEC receptacles J100 through J105 (refer to Table 2–3) and from terminal block TB2 (refer to Figure 2–7) is the same as the AC input voltage to the PDU.

CAUTION **Separate power sources should be provided for the system and for each of the Single Phase PDU cords.**

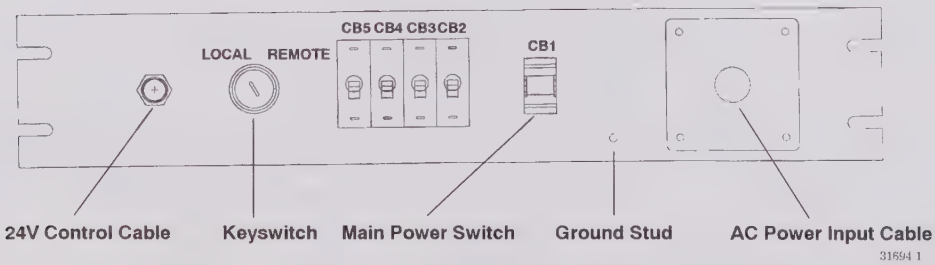


Figure 2–5 PDU, Front View

PDU Controls and Outputs

The LOCAL/REMOTE keyswitch allows you to choose the operating mode of the PDU. When the key is in the LOCAL position, the main power switch, CB1, controls the PDU output power. In the REMOTE position, with the 24V control cable connected to connector J216 on the test system's I/O panel, the test system controls the PDU output power.

The following table summarizes the controlling functions and the power limits of the four output circuit breakers. The outputs pass through the PDU's rear panel, as shown in Figure 2–6.

Table 2–3
Output Power Limits

Circuit Breaker	Outputs	Maximum Current @ 100 - 120V	Maximum Current @ 200 - 240V
CB2	TB2, Section 2	20A	10A
CB3	TB2, Section 1	20A	10A
CB4	J100 - J102	10A	10A
CB5	J103 - J105	10A	10A
All	All	24A	16A

CAUTION **The maximum total current from the PDU's six receptacles and terminal block TB2 connections is 24A @ 100 to 120V and 16A @ 200 to 240V.**

NOTE The Programmable User Power Supply chassis, GenRad PN 9001–0010–XX, can use a maximum of 20A@ 100 to 120V and 10A @200 to 240V.

Figure 2–6 shows the location of the four access holes to the TB2 terminals. Attach an appropriate wiring strain relief, GenRad PN 4350-1409-00 or equivalent, and a mounting plate, GenRad PN 9025-1445-00 or equivalent, to each access hole used. Route the wires attached to TB2 through the strain relief(s).

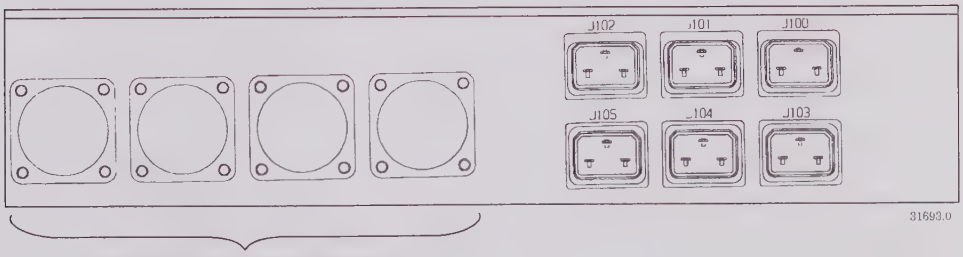


Figure 2–6 PDU, Rear View

TB2 Wiring Connections

WARNING **To prevent electronic shock, all wiring should only be performed by qualified trained personnel.**

Wiring to this terminal block, shown in Figure 2–7, requires two leads with lugs for #6 screws and a ground connection. Connect the line lead to an SEC 1 L or SEC 2 L terminal. Connect the neutral lead to an N terminal. Connect the ground lead to one of the #10 ground studs, using ring-type lugs.

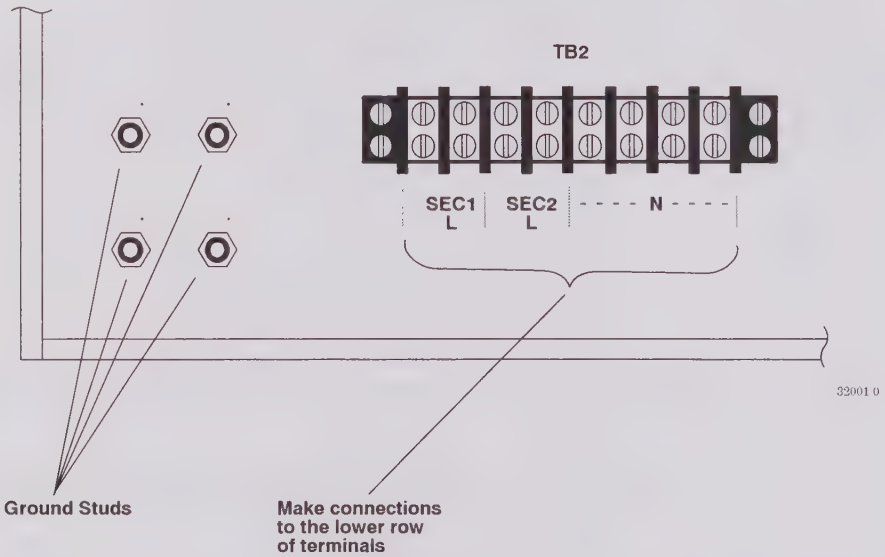


Figure 2–7 Location of TB2 and Ground Studs (partial top view with access cover removed)

100 - 120V Input Power Connections

The 100 - 120V model requires a 100 to 120V single phase input power service with 2 wires plus safety ground, 50/60 Hz, 30A minimum. Earth ground to neutral voltage must not exceed 5V rms and is typically 0V. The 15 ft (4.57 m) input power cable is terminated with a Hubbell 330P4W, or Hubbell 2611 (or equivalent) 2-pole, 3-wire grounding plug, shown in Figure 2–8. The mating receptacle Hubbell 330R4W, or Hubbell 2610A (or equivalent) should be installed by the customer prior to system delivery. Refer to Figure 2–9 for the correct receptacle wiring.

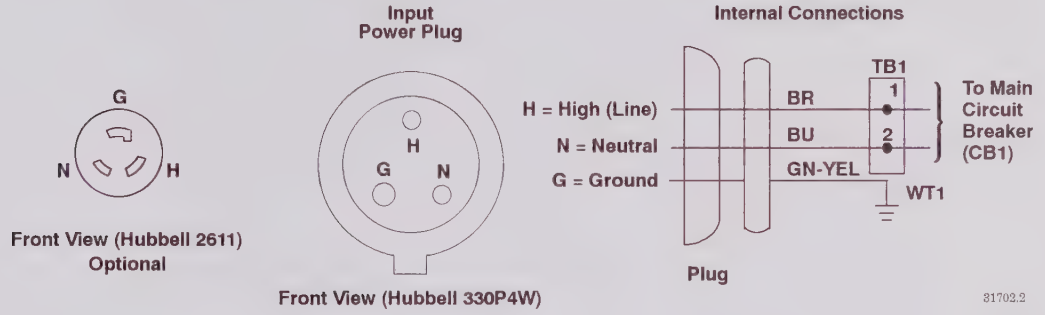


Figure 2–8 120V Single Phase Plug Wiring

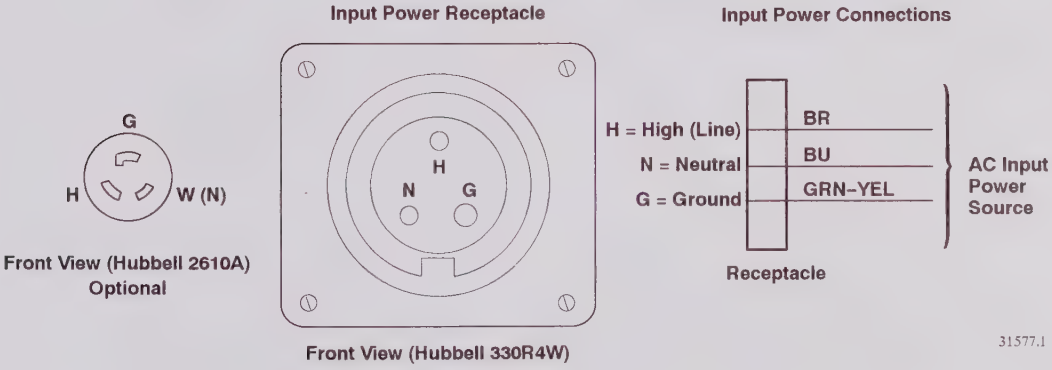


Figure 2–9 120V Single Phase Mating Receptacle Wiring

200 - 240V Input Power Connections

The 200 - 240V model requires a 200 to 240V single phase input power service with 2 wires plus safety ground, 50/60 Hz, 16A minimum. Earth ground to neutral voltage must not exceed 5V rms and is typically 0V. The 15 ft (4.57 m) input power cable is terminated with a Hubbell 316P6W (or equivalent) 2-pole, 3-wire grounding plug, shown in Figure 2–10. The mating receptacle (Hubbell 316R6W or equivalent) should be installed by the customer prior to system delivery. Refer to Figure 2–11 for the correct receptacle wiring.

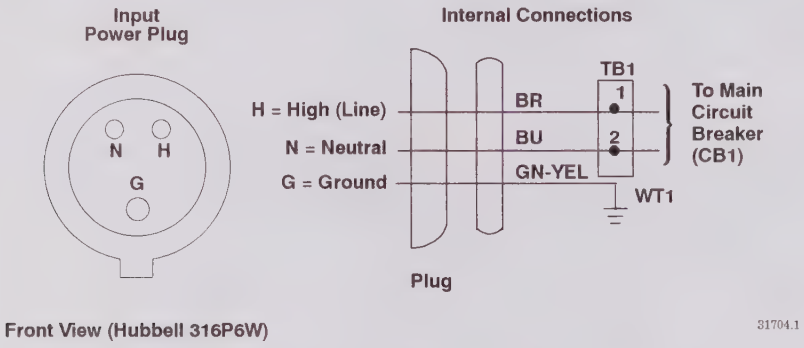


Figure 2–10 200 to 240V Single Phase Plug Wiring

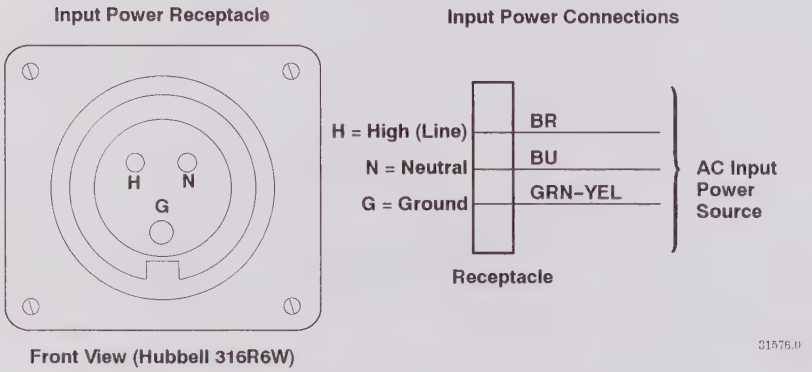


Figure 2–11 200 to 240V Single Phase Mating Receptacle Wiring

Input Power Verification

➤ To verify that the AC power source receptacle is wired correctly and prepare the system for the power-up procedure

1 Measure the voltage between H and N on the receptacle. The measured voltage should be 120V ± 10% nominal for the low voltage configuration or 200 to 240V ± 10% nominal for the high voltage configuration.

2 Measure the voltage between H and G on the receptacle. The measured voltage should be 120V ± 10% nominal for the low voltage configuration or 200 to 240V ± 10% nominal for the high voltage configuration.

3 Measure the voltage between N and G on the receptacle. The measured voltage should be less than 5V and is typically 0V.

System with Optional 3 Phase Power Controller

NOTE For this version a single 3 Phase input cord is required.

Input Line Voltage Versions

Four input voltage versions are available. Each version is listed along with a brief description and its applicable input and current capacity requirements.

Version	Description
1	Required Service: 208/120 volt, 3 Phase, 60 amperes per phase. The maximum controller rating for this version is 48 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 50 amperes.
2	Required Service: 208/120volt, 3 Phase, 30 amperes per phase. The maximum controller rating for this version is 24 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 30 amperes.
3	Required Service: 380–415/220–240 volt, 3 Phase, 32 amperes per phase. The maximum controller rating for this version will be 30 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 30 amperes.
4	Required Service: 380–415/220–240 volt, 3 Phase, 16 amperes per phase. The maximum controller rating for this version is 16 amperes per phase. The main circuit breaker/main system disconnect switch is rated at 20 amperes.

NOTE Version 1 is available with the optional terminal block.

Controller Input Power Requirements

WARNING **To avoid shock hazard, the system must be operated with an adequate earth ground.**

Wiring must conform to country and local electrical codes.

NOTE This product is intended for installation in accordance to IEC 664, Installation Category II. This category indicates that this product is designed for use at the local level and refers to the local power distribution within your building.

You can order the controller in the low voltage or high voltage AC input power configuration with a frequency of 50 or 60 Hz.

Table 2–4
Comparison of Low vs. High Voltage Configuration

Low Voltage Configuration	High Voltage Configuration
208/120 V, 3 Phase Wye (4 wires plus ground)	380–415 V/220–240 V, 3 Phase Wye (4 wires plus ground)
Range = 108 to 132 V (nominal of 120 V, phase to neutral)	Range = 198 to 264 V (nominal of 220, 230 or 240 V, phase to neutral)

The requirements for the plug, power cord, and the maximum loads allowable on a branch circuit for cord and plug utilization vary on a country–to–country basis. Install the system in accordance with all applicable codes for the system voltage configuration and installation location.

The AC input power source (and receptacle) for the system must be installed by the customer prior to system installation. Make certain that the receptacle connector that accepts the controller's plug meets the controller's voltage and current requirements. It is the customer's responsibility to procure and install the mating receptacle. The Hubbell* series of plug/receptacle connectors (specified in the following power configurations) comply with most country and local electrical codes.

* Harvey Hubbell, Inc., Wiring Services Division, Bridgeport, CT 06602, or Sager Electrical Supply, 60 Research Rd, Hingham, MA 02043, tel: (617) 749–6700.

208/120 VAC Input Power Configuration Range, 60A Required Service

With this configuration, the system requires 3 Phase input power service in the range of 208/120 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 60 A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 560P9W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2-12 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 560R9W or equivalent) is to be procured and installed by the customer prior to delivery of the system. Refer to Figure 2-13 for the correct plug wiring. Refer to Figure 2-14 to for the correct receptacle wiring.

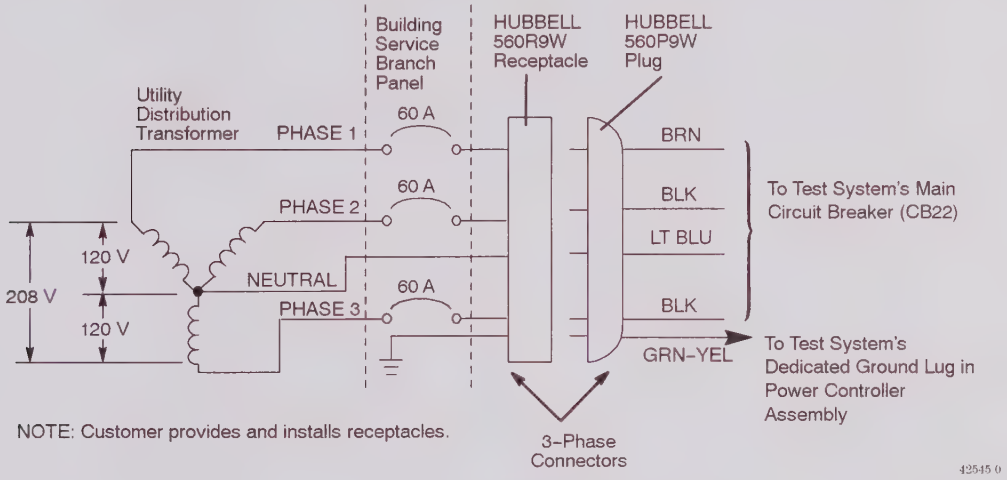


Figure 2-12 208/120 Volt 3 Phase Wye Connections

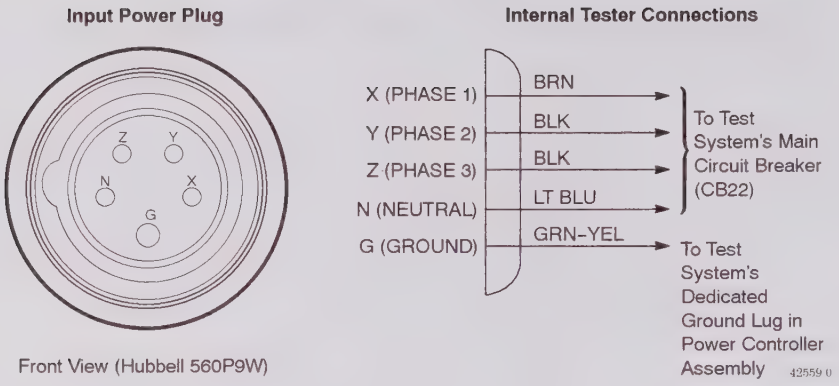


Figure 2–13 Wiring of Input Power Cable Plug

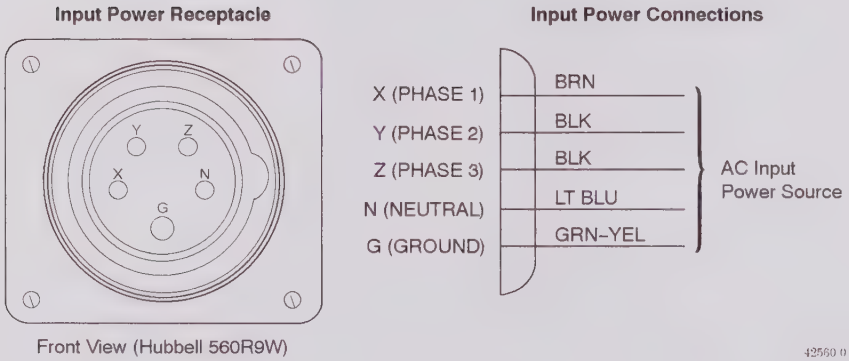


Figure 2–14 Wiring of Mating Receptacle for Input Power Cable Plug

208/120 VAC Input Power Configuration Range, 30A Required Service

With this configuration, the system requires 3 Phase input power service in the range of 208/120 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 30A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 530P9W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2-15 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 530R9W or equivalent) and angle box are to be procured and installed by the customer prior to delivery of the system. Refer to Figure 2-16 for the correct plug wiring. Refer to Figure 2-17 for the correct receptacle wiring.

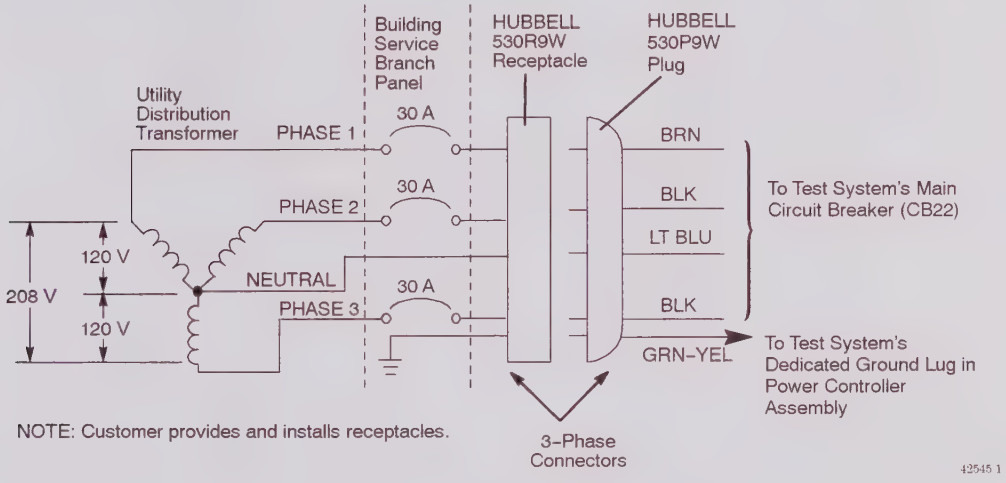


Figure 2-15 208/120 Volt 3 Phase Wye Connections

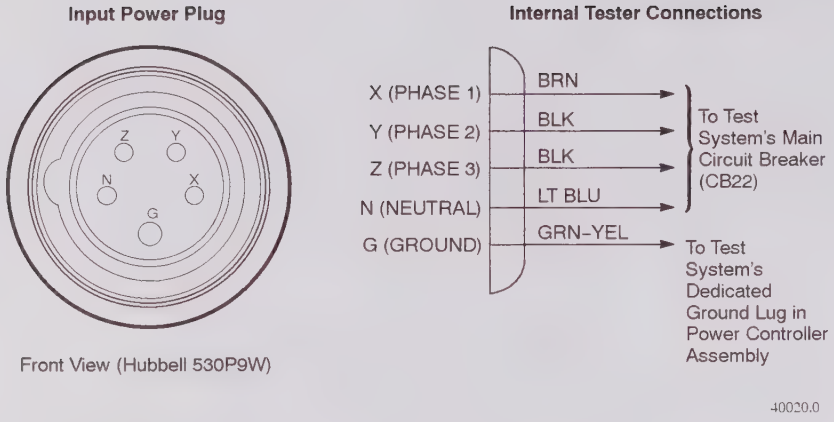


Figure 2–16 Wiring of Input Power Cable Plug

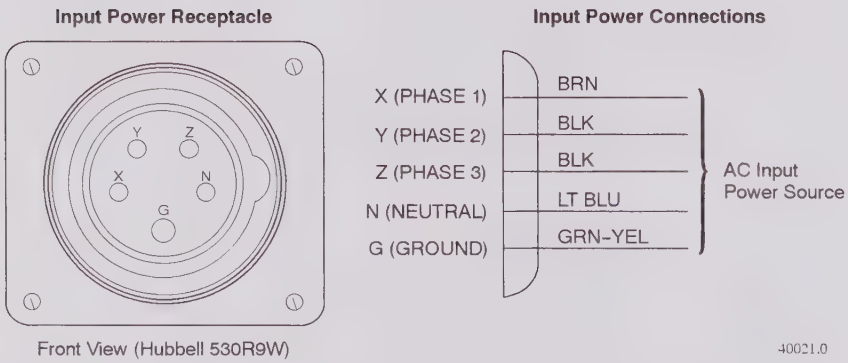


Figure 2–17 Wiring of Mating Receptacle for Input Power Cable Plug

380 - 415/220 - 240 VAC Input Power Configuration Range, 32A Required Service

This configuration of the system requires 3 Phase input power service of 380-415/220-240 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 30A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 532P6W (or equivalent) 4-pole, 5-wire grounding plug. Refer to Figure 2-18 which illustrates the power-plug wiring to the system's AC power cable. The mating receptacle (Hubbell 532R6W or equivalent) and angle box are to be procured and installed by the customer prior to system delivery. Refer to Figure 2-19 for the correct plug wiring. Refer to Figure 2-20 for the correct receptacle wiring.

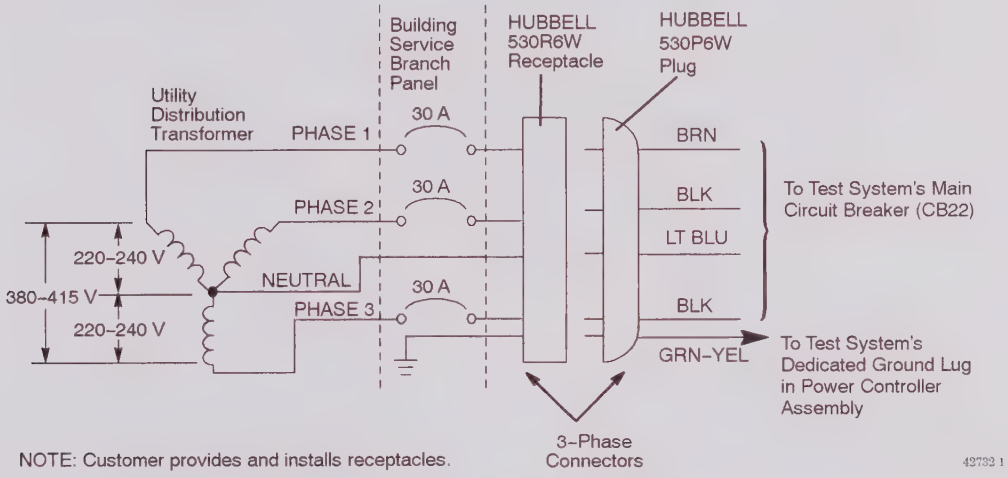


Figure 2-18 380-415/220-240 Volt 3 Phase Wye Connections

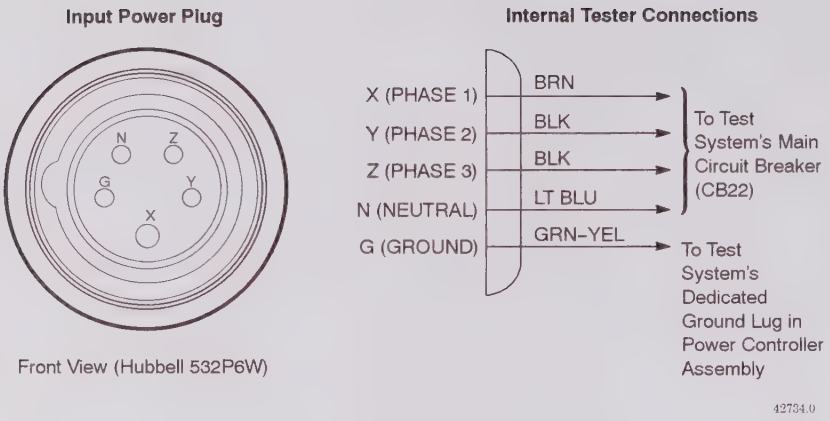


Figure 2–19 Wiring of Input Power Cable Plug

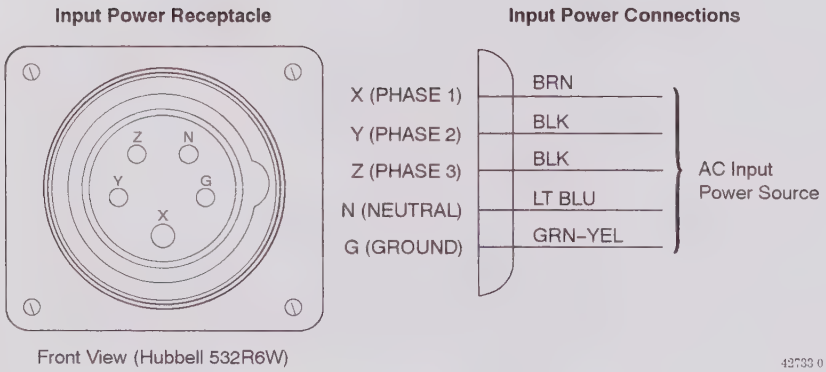


Figure 2–20 Wiring of Mating Receptacle for Input Power Cable Plug

380 - 415/220 - 240 VAC Input Power Configuration Range, 16A Required Service

This configuration of the system requires 3 Phase input power service of 380-415/220-240 VAC wye connected, 4-wire plus safety ground, 50/60 Hz, 16A per phase. The system is supplied with a 14.6 ft (4.5 m) power cable terminated with a Hubbell 516P6W (or equivalent) 4–pole, 5–wire grounding plug. Refer to Figure 2–21 which illustrates the power–plug wiring to the system's AC power cable. The mating receptacle (Hubbell 516R6W or equivalent) and angle box are to be procured and installed by the customer prior to system delivery. Refer to Figure 2–22 for the correct plug wiring. Refer to Figure 2–23 for the correct receptacle wiring.

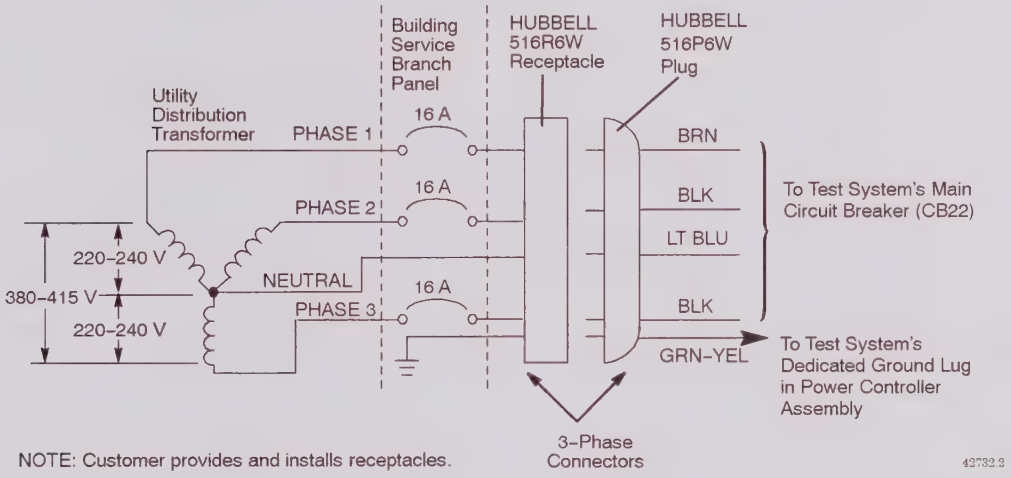


Figure 2–21 380–415/220–240 Volt 3 Phase Wye Connections

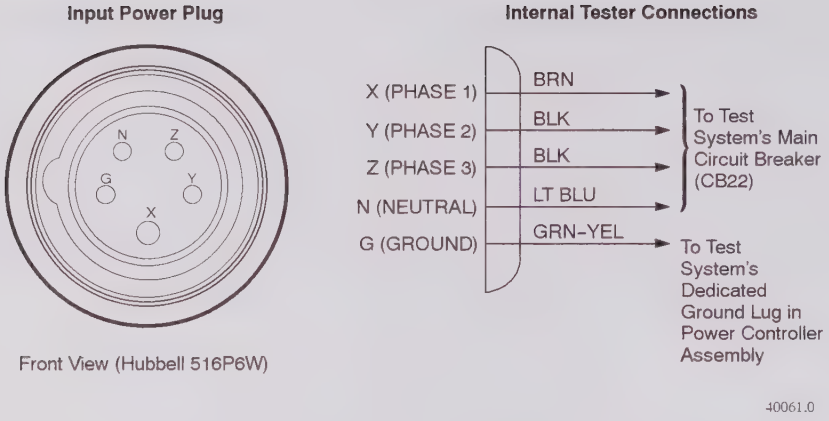


Figure 2–22 Wiring of Input Power Cable Plug

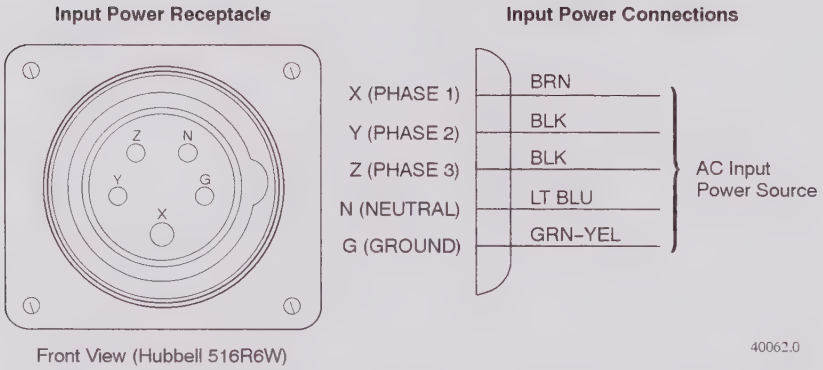


Figure 2–23 Wiring of Mating Receptacle for Input Power Cable Plug

Cooling Requirements

The site cooling plant must be able to compensate for the heat produced when the system is in operation. The heat produced by the system (and external peripherals) is computed based upon the system's rated electrical power. The rated electrical power is 2.42 kW for a system operating with 120V input. The rated electrical power is 2.62 kW for a system operating with 240V input. Therefore, the installation site should be capable of removing 8.25 K BTU/h of heat generated by the dissipated power for a system operating with 120V input and 8.94 K BTU/h for a system operating with 240V input.

Test Fixture Procurement

The test fixture is the adaptor that holds the board to be tested and makes electrical contact with the circuit nodes on the board. Each different board usually requires its own fixture. The user has two options: (1) buying an assembled/wired test fixture from a fixture supplier (ready for system use) or (2) assembling/wiring a test fixture from a kit purchased from a fixture supplier.

Vacuum is required for bed-of-nails in-circuit fixtures. Vacuum mates the unit-under-test to the test fixture. The customer is responsible for providing vacuum and its control to the fixture's vacuum port. If required, contact your fixture supplier or GenRad sales engineer for additional information.

Unpacking and Installation Tools and Equipment

You can save valuable time during installation by obtaining the required tools and equipment prior to system delivery. The following tools and equipment (or their equivalents) are required for unpacking and installing the system:

- Fork lift with a 4 ft (1.2 m) fork, to move the system to the unpacking location
- Strap cutter
- Safety goggles (to wear when cutting straps)
- Cutters and long-nose pliers (for removing staples from the system shipping carton)
- Digital voltmeter
- Ratcheting socket wrench with socket for 1/4 in. (6.35 mm) hex-head bolts (for removing two hex-head lag screws from the shipping skid)
- Flat-blade screwdriver
- Phillips-head screwdriver, number 2 size

Safety Considerations

Introduction

The following paragraphs contain considerations relating to the safety of both personnel and the equipment.

Fire Protection

Precautions against fire should be taken. Permanent documents, tape cartridges, spare parts, and like items should be stored in a fireproof area. Overhead sprinklers can be used if the water heads are not directed at the equipment. Additionally, sprinkler heads should not be located directly over the system or its fan intake/exhaust path. Wall-mounted CO^2 (carbon dioxide) fire extinguishers should be located within easy reach of the system.

Safety

Facility personnel (especially operators) should be familiar with the emergency power shutdown procedure and with how to notify the fire department. Preparedness might well result in saving expensive equipment.

An operator is adequately protected from electrical shock. Nevertheless, personnel trained in first aid for electrical shock and burns should be always available.

Unauthorized personnel should not remove from the system those panels that are provided for system cooling and protection of the electronics. The instruction manuals should be reviewed for precautions needed to assure safe operation.

Site Planning Considerations

This chapter describes recommendations for optimizing operator productivity. This chapter also provides site maintenance suggestions.

Fixture Storage

A fixture storage rack (on wheels) should be located near the system for fast and easy access to system test fixtures.

CAUTION **To prevent equipment damage or corrosion to electrical contacts on test fixtures, use the fixture cover, if available.**

Circuit Board Storage Racks

Circuit board storage racks (on wheels) facilitate test system throughput. Placing a rack of untested boards on one side of the operator and a rack of tested boards on the other side of the operator provides an efficient manner of handling circuit boards. An additional rack for defective boards can also be useful. In addition, the racks permit easy movement of circuit boards to and from the system within the production area.

Site Suggestions

The following suggestions are provided to help you optimize system performance.

- Install a bulletin board near the system for posting messages.
- Obtain static control equipment. One company offering such equipment is Static Control Systems/3M, 223-2SW, 3M Center, St. Paul, MN 55144.
- Provide space in your facility for storing printer paper.
- Provide a portable vacuum cleaner (with a non-metallic brush attachment) for cleaning the top of the fixture before the start of board testing.
- Keep a maintenance log, particularly for preventive maintenance. Secure all maintenance documentation, including the documentation for peripheral items, so that certain supply items and options can be obtained and preventive maintenance schedules are available when needed.
- Consult GenRad about a maintenance contract and other services.

Remote Support Site Requirements

A remote support software package, enables remote access to a PC application over a modem.

A modem and the remote support software allow us to provide remote applications and hardware support for your test system. However, providing timely and efficient support in an environment with multiple software layers requires that you allow us to log on to your test system. We strongly recommend that you provide a dedicated, remote support phone line to your test system.

Customers outside North America must provide their own modem because the modem must be compatible with the local phone system.

Telephone Line Selection

The telephone line used for data communications should be a standard direct line in and out of the building. In order for GenRad to dial in to provide remote support, the line must be a direct line into the PC. The line cannot go through an operator or a switchboard.

The telephone line should be installed near the system and connected to a remote support modem. This modem enables you to connect a telephone to the modem so you can make normal telephone calls when your modem is not in use. You simply connect your telephone cord to the connector labeled PHONE on the rear panel of the modem. The telephone enables the operator to contact supervisory personnel in production, test engineering, and application engineering when necessary.

Telephone Cable Placement

The internal fax/modem, supplied to North American customers, includes a telephone cable used to connect the modem to a telephone line. You must install a telephone jack on the telephone line. Use a standard RJ11C modular telephone jack (normally used for office and residential telephones). You can also use a RJ45S data jack. The jack must be mounted within 7 ft (2.1 m) of the test system for the provided telephone cable to reach.

The telephone cable must follow a route that is electrically noise-free. For example, do not route the telephone cable near a three-phase, 400V power cable.

FCC Requirements

The Federal Communications Commission (FCC) regulates connection of the PC to the public switched telephone network in the USA. Refer to FCC Rules and Regulations, Part 68. These regulations require the following:

- Connection of this equipment to a party line or coin-operated telephone service is prohibited.
- Before connecting this equipment to the switched telephone network, notify the telephone company of the following information:
  - The telephone number to which the equipment is connected
  - Modular jack number USOC RJ11C or RJ45S
  - FCC registration number

  If you are connecting other devices with this equipment, provide the telephone company with equivalent information for each device.
- When you experience trouble, promptly disconnect this equipment from the telephone line to determine which equipment is malfunctioning. If this equipment is at fault, leave it disconnected until the problem has been corrected. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service until they are satisfied that the problem is corrected.
- The telephone company may make changes in its communication facilities, equipment, operations, and procedures, if such actions are reasonably required in the operation of its business. If this occurs, you are notified in writing by the telephone company.

System Supplies

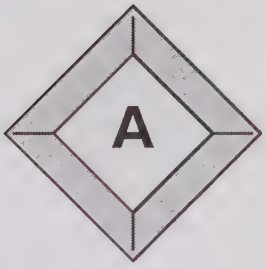
Printer Ribbon Cartridges

Okidata Microline 320 line printer-ribbon cartridges are available from GenRad as PN 1765-4105 (one cartridge).

Printer Paper

Okidata Microline 320 line printer paper is $9^1/_2$ x 11 in. (24.13 x 27.94 cm) fanfold, $^1/_2$ in. (1.27 cm) vertical perforated left and right, 1000 continuous sheets per box. For single part forms, the printer handles paper weights ranging from 12 to 24 lbs (5.35 to 10.7 kg) and paper thicknesses ranging from 0.002 to 0.0049 in. (0.051 to 0.125 mm). For multipart forms (original plus four copies), the printer handles paper weights ranging from 9 to 11 lbs (4.08 to 4.98 kg) up to a maximum thickness of 0.014 in. (0.36 mm). This paper is available from Standard Business Forms Co., Moore Business Forms Co., and similar type computer paper supply companies.

Site Preparation Checklist



Description and Use

The following activities should be part of the site preparation. You should initial this checklist only after each activity has been completed. If you require site planning assistance, telephone GenRad from 8am to 8pm eastern time at (800) 4GENRAD (numerical dial 800–443-6723 and select the number 1, then the number 2), if calling from the United States. Outside the United States, telephone 1-978–589-7000.

➤ To prepare your site **Initials**

1 *Identify the desired location for installation of the

- ◆ System _____
- ◆ Personal Computer, Monitor and Printer _____

2 *Verify that all environmental requirements are met

- ◆ Temperature _____
- ◆ Humidity _____
- ◆ Cleanliness _____
- ◆ Free of airborne contaminates _____

3 Plan the delivery route to the chosen site _____

4 *Obtain the required, stable input power for the site

- ◆ System power available at system location _____

NOTE System installation requires a power receptacle compatible with the National Electrical Manufacturer's Association (NEMA) standards as well as local electrical codes. Make certain, when ordering the power receptacle from your vendor, that the lead time for the receptacle's delivery allows for its installation prior to the planned system delivery date.

- ◆ Date that power receptacle was ordered _____ _____
- ◆ Power receptacle part number _____ _____

5 Decide/install the type of flooring (unless cabling is to be installed under a raised floor) _____

*Denotes a critical item. The system cannot be installed without these requirements being met.

6 Design the equipment, furniture, and storage layout for the site. Consider

- Future expansion _____
- Safety and comfort _____
- Any required cabling to local and remote peripherals _____
- *Leave a minimum of 40 in. (102 cm) between any side of the system and the nearest wall, or any other obstacle that could restrict system access or air flow. _____
- *Leave a minimum of 12 in. (30.5 cm) between the sides of the system and the nearest peripheral. _____

7 Provide, in the site preparation plan, for these items

- Telephone and modem line (analog line is required) _____
- Fire extinguisher _____
- Sufficient space for other equipment, such as tables and board carts or racks to be moved around the system _____
- Storage equipment for fixtures _____
- Storage for additional supplies such as printer paper and ribbons, tape cartridges, PC diskettes, and system air filter kit _____

8 Provide for air conditioning (if applicable)

9 Static control equipment

10 Verify that the following items will be present or incorporated at the site:

- Identify the loading, testing, and acceptance criteria for any layered software. _____
- GenRad's remote support requirements _____
- Determine Ethernet or other networking requirements for the site. Ensure that the system's configuration matches the site requirements. _____
- Verify the network host system protocol _____
- Confirm that the Ethernet node is functional prior to the system's delivery. _____

* Denotes a critical item. The system cannot be installed without these requirements being met.

Index

A

AC Input Power Connector, 2-6
AC Input Power Cords, 2-7
AC Input Power Requirements, 1-3
AC Power Plugs, 2-6
AC Power Shutdown, 3-1
Access, service, 2-2
Access Holes, wiring, 2-9
Air Vents, 2-2
Applications Support, 4-2
Assistance, site planning, A-1

C

Checklist, site preparation, 1-1
Circuit Board Storage Racks, 4-1
Close–Up, 4-2
Connecting Lugs, 2-10
Connections
  input power
    120V, 2-11
    200 to 240V, 2-12
  lugs, 2-10
  terminal block, 2-10
Control Functions, PDU, 2-9
Cooling Requirements, 1-3

D

Delivery Routing, 1-3
Dimensions
  options, 2-2
  uncrated system, 2-2

E

Emergency Shutdown, 3-1
Environmental Requirements, 1-2
  operating, system, 2-4
  storage, system, 2-4

F

FCC Requirements, 4-3
Fire Protection, 3-1
Fixture, procurement, 2-23

G

GR2000, system layout, 1-1
GR4000, system layout, 1-1

H

Hardware Support, 4-2

I

Input Power Connections
  120V, 2-11
  200 to 240V, 2-12
Input Power Connector, 2-6
Input Power Cords, 2-7
Input Power Plug
  120V, 2-11
  200 to 240V, 2-12
Input Power Receptacle
  120V, 2-11
  200 to 240V, 2-12
Input Power Requirements, 2-5
  power quality, 2-5
Input Power Verification, 2-12
Installation, tools for unpacking and installing, 2-24

L

Local PDU Operation, 2-9
Lugs, 2-10

M

Maintenance Access, 2-2

O

Operating Environment, system, 2-4
Optional Cabinet, 2-2
Output Power Limits, 2-9

P

PDU Control Functions, 2-9
PDU Controls and Outputs, 2-9
PDU Power Limits, 2-9
Planning, space, 2-2
Power Control Functions, PDU, 2-9
Power Cords, 2-7
Power Limits, PDU, 2-9
Power Plugs, 2-6
Power Requirements, 1-3, 2-5, 2-7
Power Shutdown, 3-1
Printer Paper, 5-1
Printer Ribbon Cartridges, 5-1

R

Ramps, Unloading, 2-4
Remote PDU Operation, 2-9
Remote Support, 4-2
Remote Support Site Requirements, 4-2
Requirements
  cooling, 1-3
  environmental, 2-4
  FCC, 4-3
  lugs, 2-10
  power, 1-3, 2-7
  space, 2-2
  system input power, 2-7
  test fixture vacuum, 2-23
  weight, 2-2
RJ11C, 4-3
RJ45S, 4-3
Routing, delivery, 1-3

S

Safety
  fire, 3-1
  personal, 3-1
Service Access, 2-2
Shipping Information, 2-2
Shipping Skids, 2-3
Site Planning, 1-1
Site Preparation Checklist, A-1
Site Requirements, remote support, 4-2
Space Planning, 2-2
Space Requirements, 1-2, 2-2
Storage, environment, system, 2-4
Storage Racks, circuit boards, 4-1
Strain Relief, wiring, 2-9
Supplies
  printer paper, 5-1
  printer ribbon cartridges, 5-1
Support, applications and hardware, 4-2
System Input Power Requirements, 2-5, 2-7
  power quality, 2-5
  power verification, 2-12
system layout, 1-1

T

TB2 Wiring Connections, 2-10
Telephone, 4-2
  cable placement, 4-3
  line selection, 4-2
Telephone Connections, 4-3
Terminal Block Connections, 2-10
Tools, for unpacking and installing system, 2-24
Troubleshooting, 4-3

U

Uncrated Dimensions and Weight, 2-2
Unloading Ramps, 2-4

V

Vacuum Requirements, 2-23
Vents, air, 2-2
Verification, input power, 2-12

W

Weight
  options, 2-2
  plant floor loading capacity, 1-2
  system and peripherals, 2-2
  uncrated system, 2-2
Wiring Access Holes, 2-9
Wiring Strain Relief, 2-9

GenRad

Reader Comments

Part Number _____

Title _____

To keep our manuals useful and accurate, we need your opinion. Please complete this page when appropriate, and return it to us. Your suggestions and comments will help improve this publication.

	Poor	Good	Excellent
Accuracy	☐	☐	☐
Organization	☐	☐	☐
Readability	☐	☐	☐
Design	☐	☐	☐
Illustration	☐	☐	☐

Did you find any specific errors? If so, please describe them along with their exact location.

_____

_____

_____

_____

_____

How would you improve this manual?

_____

_____

_____

_____

_____

How have you used this manual?

☐ As a reference guide.

☐ To read about specific areas of interest.

☐ Other. Please specify. _____

Additional comments

_____

_____

_____

_____

♣ *The following information is optional, but helpful to us.*

Name _____ Title _____

Company _____

Address _____

City/State _____ Zip/Country _____

May we call you to discuss your comments?
If so, please include a phone number. _____

Thank you for your response.

Cut Along Dotted Line

Tape Here

READER COMMENT FORM

Fold Here Second

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 17 WESTFORD, MA

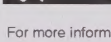
POSTAGE WILL BE PAID BY ADDRESSEE

GenRad

7 Technology Park Drive
Westford, Massachusetts 01886-0033
Attn: Technical Publications MS/10

Fold Here First

READER COMMENT FORM



For more information or for the location of your nearest GenRad Customer Center (sales and service), contact:

North America

Westford, MA
TEL: 1-800-4-GENRAD
FAX: 1-978-589-7007

Western Region Sales & Support
(including Mexico,
Latin & South America)
Irvine, CA
TEL: 1-800-4-GENRAD
TEL: 1-714-852-5170
FAX: 1-714-250-3948

Western Region Technology Center
San Jose, CA
TEL: 1-800-4-GENRAD
TEL: 1-408-321-3500
FAX: 1-408-432-0267

Northern Region Sales & Support
Westford, MA
TEL: 1-800-4-GENRAD
TEL: 1-978-589-7000
FAX: 1-978-589-2099

Southern Region Sales & Support
Orlando, FL
TEL: 1-800-4-GENRAD
TEL: 1-407-260-8007
FAX: 1-407-260-8055

Central Region Sales & Support
Arlington Heights, IL
TEL: 1-800-4-GENRAD
TEL: 1-847-577-1881
FAX: 1-847-577-1926

Canada
Holland Landing, Ontario
TEL: 1-905-898-4181
FAX: 1-905-898-4292

Asia Pacific

Singapore
TEL: 65-278 4400
FAX: 65-776 6422

Europe

France
TEL: 33 1 49442200
FAX: 33 1 49442299

Germany
TEL: 49 89 962850
FAX: 49 89 96285101

Italy
TEL: 39 2 580701
FAX: 39 2 5807060

Switzerland
TEL: 41 1 4222420
FAX: 41 1 4222065

United Kingdom
TEL: 44 1 628 544200
FAX: 44 1 628 544244

All Other Countries
GenRad, Inc.
International Department
7 Technology Park Drive
Westford, MA 01886-0033
U.S.A.
TEL. 1-978-589-7000
FAX. 1-978-589-7007

http://www.genrad.com

Updated 7/97

GenRad The Technology of Knowledge

7 Technology Park Drive, Westford, MA 01886-0033

Printed in U.S.A.